Xinpu Software_Ford Edge, Explorer, Taurus, Mondeo, Raptor_Serial Communication

Agreement (US version & Chinese version SYNC) V1.38.001

Compatible models:

2013 Edge, 2013 Raptor F-150, 2013 Explorer, 2013 Taurus,

2013 Mondeo (Mondeo or foreign Fusion), domestic 2015 Edge;

Note: The host does not need to process the functions marked "reserved" in this agreement. This agreement is streamlined from the Ford Full Compatibility Agreement.

Based on the original V1.36.000, the functions of Focus, Escape, Escape and Fiesta models are deleted.

This document describes the communication protocol between the DVD host system and the bus decoder, involving the physical layer, data link layer, and application layer protocols.

discussion.

Physical layer description

Using standard UART communication interface, the logic level is 3.3V or 5V (depending on the pull-up resistor of the audio host) TTL level, UART Works in 8N1 mode, that is, 8 data bits, no parity, one stop bit, and the baud rate is fixed at 38400bps.

Link layer description

1. Agreement

HOST: NAVI host

SLAVE: bus decoder

2. Data frame structure

Data order	Data content	Remark
1	Head Code	Fix to 0x2E
2	Data Type	See the table below for DataType definitions
3	Length	Data length
4	Data0	Data content
5	Data1	
6	....	
....	Datan	
N	Checksum	Checksum SUM(DataType, Length, Data0,…Datan)^0xFF

3. ACK/NAK

1), ACK/NACK definition

Send/Receive data	The contents of Send/Receive frame	Comment
1	ACK/NACK	0xff------ACK 0xf0-----NACK(Checksum NG)

		0xf3-----NACK(Not support) **0xfc-----NACK(Busy)**

The response frame consists of only one byte.

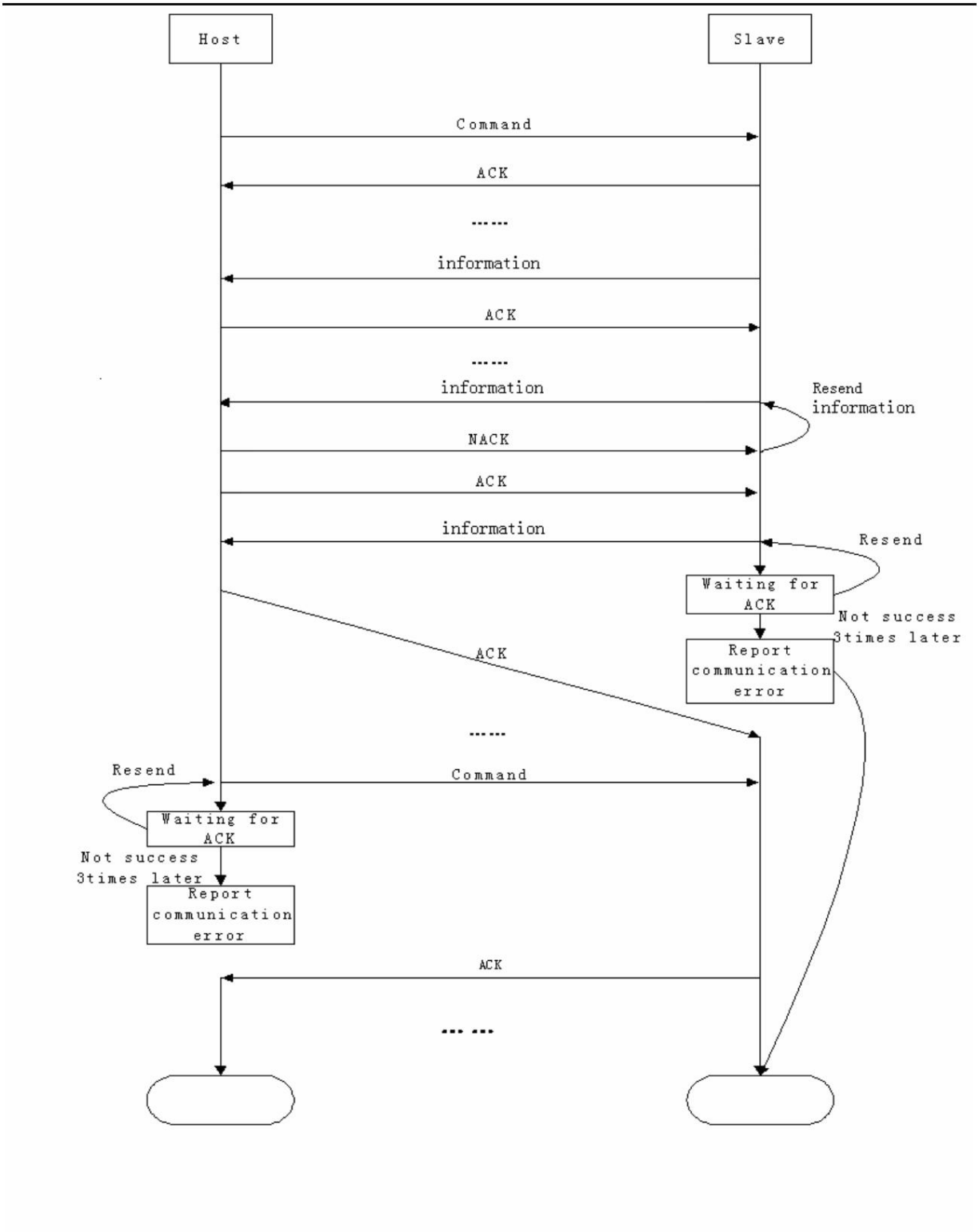
2) After receiving a frame of data, the receiving end should return ACK or NACK within 10ms. The receiving end of ACK/NACK should be able to respond within 0 to 100ms.

Receive ACK/NACK within.

3). If no ACK is received within 100ms, the frame of data will be retransmitted. If the number of retransmissions reaches three times, all transmissions will be stopped.

Come down and handle the error accordingly.

4. Example of communication data sequence



Application layer

Serial number definition description		Coding notes	
SLAVE-Host			
	Backlight adjustment	0x14	
information 1 2 Radar information		0x20	
3	behind steering wheel buttons	0x22	
4 Front radar information		0x23	
5	Version Information	0x30	
6	Basic Information	0x24	
7	radar status	0x25	
8	EPS steering wheel corner	0x26	V1.38.000
9 Language setting status		0x27	V1.05.000
10 Air conditioning information (manual air conditioning)		0x29 is for 2013 F150, EDGE, EXPLORER SUV model mid-low configuration Added V1.23.000	
11	SYNC SRT UP	0x70 US version only (V1.10.000)	
12	SYNC STR DOWN	0x71 US version only (V1.10.000)	
13	SYNC SRT SHORT	0x72 US version only (V1.10.000)	
14	SYNC status	0x78	V1.01.000
15	SYNC switching request	0x79	V1.02.000
16	SYNC version	0x40	V1.10.000
17	SYNC (China version) menu information	0x50	V1.10.000
18	SYNC (China version) menu item information	0x51	V1.10.000
19	SYNC (China version) current MEDIA track playback time information	0x52	V1.10.000
20	SYNC (China version) phone call time information 0x53		V1.10.000
twenty one	SYNC command 1	0X7E	V1.38.001
twenty two	SYNC command 2	0X7F	V1.38.001
Host-SLAVE			
1	Start/End	0x81	
2 Request decoder status		0x90	V1.01.000
3	Control instruction	0xC6	
4	source	0xC0	V1.38.001
5	Radio information	0xC2	V1.38.001
6	CD status information	0xCD	V1.38.001

Note: The ÿ red fonts appearing in this article are the new and modified content ÿ and the yellow fonts are remarks ÿ

2. Data format

2.1. Decoding end->Host end

2.1.1. Backlight adjustment information [0x14] (decoder side -> host side)

Data order	Data content	Remark
Data Type	0x14	type of data
Length	0x01	Data length
Data0	Backlight brightness (Small light & screen brightness)	0x00: Min 0xFF: Max

(Note: The IO port has no body light status output, only PWM backlight brightness output)

2.1.2. Steering wheel button [0x20] (decoder side -> host side)

Data order	Data content	Remark
Data Type	0x20	type of data
Length	0x02	Data length
Data0	Key Code	0x00: No button (pop up) 0x01: VOL+ 0x02: VOL- 0x03: >>| (The decoder will handle this key V1.01 by itself in PHONE state) 0x04: |<< (The decoder will handle this key V1.01 by itself in PHONE state) 0x05: PHONE V1.32.000 0x06: MUTE V1.34.000 0x07: SRC (V1.01 is only available on cars without SYNC) 0x0E: UP (the decoder will handle this key V1.01 by itself in SYNC state) 0x0F: DOWN (the decoder will handle this key V1.01 by itself in SYNC state) 0x10: LEFT (the decoder will handle this key V1.10 by itself in SYNC state) 0x11: RIGHT (the decoder will handle this key V1.10 by itself in SYNC state) 0x12: OK (the decoder will handle this key V1.01 by itself in SYNC state) The following buttons are ESCAPE panel buttons original car panel buttons V1.22.000 0x20 ~ 0x29: Number 0----Number 9 0x2A: * 0x2B: # 0x33: SIRIUS 0x34: RADIO 0x35: CD 0x36: AUX 0x37: MENU 0x38: SOUND 0x39: PHONE 0x3D: CLOCK

		0x3F: POWER **0x48: OK** **0x49: LEFT** **0x4A: RIGHT** **0x4B: UP** **0x4C: DOWN** **0x52: |<</Answer the phone** **0x53: >>|/Hang up the phone** **0x54: EJECT** **0x56: TA** **0x57: INFO** **0x59: DSP** **0x5A: MUTE** **0x5B: DISPLAY** **0x5C: K1 (soft key left)** **0x5D: K2 (soft key left middle)** **0x5E: K3 (middle right soft key)** **0x5F: K4 (soft key right)** **0x60: TUNER+ (domestic Ruijie high-end configuration) V1.38.000** **0x61: TUNER-(domestic Ruijie high-end configuration) V1.38.000** **0x62: PLAY/PAUSE (domestic Ruijie low configuration) V1.38.000** **0xF0: Volume knob plus** **0xF1: Volume knob decreases**
Data1	**Key status**	**Key Code is V1.22.000 when the key is pressed** **0x00: key release** **0x01: button pressed** **0x02: Continuous key presses are valid** **When the Key Code is the knob, V1.22.000** **0x00 ~ 0xFF: rotation step value (Step)**

2.1.3. SUV **manual/automatic (V1.31) air conditioning information [0x29] (decoding end -> host end)** **2013 F150, EDGE, EXPLORER SUV models, mid-to-low configuration**

Data order	Data content	Remark
Data Type	**0x29**	**type of data**
Length	0x08 V1.32	**Data length**
Data0	**Air conditioner status**	Bit7: **Air conditioning switch indication** 0b: OFF 1b: ON Bit6: A/C **instruction** 0b: A/C OFF 1b: A/C ON Bit5: **Internal and external circulation indication**

		0b: **outer loop** 1b: **inner loop** **Bit3: AUTO small wind light indicator** V1.31 **0b: OFF 1b: ON** **Bit2: DAUL light indication** V1.31 **0b: OFF 1b: ON** Bit1: MAX FORNT **light indication** 0b: OFF 1b: ON **Bit0: Rearview mirror heating (note: applied in** FUSION /MONDEO **model: Rear window defogger** V1.37.000) 0b: OFF 1b: ON
Data1		**Bit7: Upward air supply switch indication** 0b: OFF 1b: ON **Bit6: Parallel air supply switch indication** 0b: OFF 1b: ON **Bit5: Downward air supply switch indication** 0b: OFF 1b: ON Bit4: Air-conditioning data change bit (the decoder determines that the air conditioner data changes except the outside temperature of the vehicle. Set for 3 seconds when the adjustment data changes) 0b: **Do not display 1b: Request to display air conditioning information** Bit3~Bit0: Air volume size 0x00~0x07: 0~7 **level air volume indication**
Data2	Air conditioning heating/cooling level Set the temperature for the left side during automatic air conditioning V1.31	**Note: The manual air conditioner does not indicate the set temperature.** 0x00 **Cool to the coldest** 0x0F **intermediate value (no heating, no cooling)** 0x1E **Heat to hottest** **For the numerical content of automatic air conditioning, refer to** DATA6 V1.31
Data3	Rear seat air conditioning heating/cooling level/wind speed	Bit0~Bit3 **rear seat air conditioning heating/cooling level** 0x00 **Cool to the coldest** 0x04 **intermediate value (no heating, no cooling)** 0x08Heat **to the hottest** Bit4~Bit6 **air volume size** 0x00~0x07: 0~7 **level air volume indication** Bit7 **rear seat air conditioning switch indication** 0b: OFF 1b: ON
Data4	**other**	Bit0 **rear seat air conditioning control status** 0b:OFF 1b:ON Bit2 AC MAX 0b==Non- AC MAX, 1b==AC MAX Bit3 **manual/automatic air conditioning working status** bit V1.31

		0b==manual 1b==automatic Bit4 **wind speed automatic bit** V1.31 0b==Non-automatic 1b==Automatic **(actual wind speed is not displayed when automatic)** Bit5 **wind direction automatic bit** V1.31 0b==Non-automatic **1b==Automatic (actual wind direction is not displayed when automatic)** Bit6 **temperature display unit** 0b==Celsius 1b==Fahrenheit
Data5	**outside temperature**	**Two's complement representation:** -40ÿ ~ 86ÿ **valid**
Data6	**Set temperature V1.31 on the right**	Val>=0x1e **and** Val<=0x3C **is degrees Celsius** 0x1E==LO 0x3C==HI 0x1F==15.5C~~~ 0x3B==29.5C Val>=0x77 **and** Val<=0xAB **is Fahrenheit** 0x77==LO 0xAB==HI 0x78==60F~~~ 0xAA==85F (even values are valid for a total of 26 levels) V1.32
Data7	**Seat heating status V1.32**	Bit0~Bit1 **left seat heating** 0==Close1 == **Level** 1 2== **Level** 2 Bit2~Bit3 **right seat heating** 0==Close1 == **Level** 1 2== **Level** 2

2.1.4. Rear radar information [0x22] (decoding end -> host end) (the decoder will only actively send this data packet when the rear radar of the car body is started)

Data order	Data content	Remark
Data Type	**0x22**	**type of data**
Length	**0x04**	**Data length**
Data0	**The distance between the left side of the rear of the car and the obstacle 0x00: not displayed**	
Data1	**The distance between the rear center left and the obstacle**	**0x01: indicates the latest V1.06**
Data2	**The distance between the center right of the rear of the car and the obstacle**	**0x1f: represents the farthest V1.06**
Data3	**The distance between the right side of the rear of the car and the obstacle**	**Range: 0x00 ~ 0x1F** **Note: The 2013 Mondeo radar data range is the same as this table** **V1.37.001**

2.1.5. Front radar information [0x23] (decoding end -> host end) (the decoder will only actively send this data packet when the front radar of the vehicle body is started)

Data order	Data content	Remark
Data Type	**0x23**	**type of data**
Length	**0x06 (V1.06.001)**	**Data length**
Data0	**Distance between the left side of the car and the obstacle 0x00: not displayed**	
Data1	**The distance between the center left of the vehicle and the obstacle**	**0x01: indicates the nearest V1.06**
Data2	**The distance between the center right in front of the car and the obstacle**	**0x1f: indicates the farthest V1.06**
Data3	**The distance between the right side of the car and the obstacle**	**Range: 0x00 ~ 0x1F**

Data4	The data range of the automatic parking assist probe on the right side of the front of the car is the same as above. This radar data is currently only available when the automatic parking assist system is available.
Data5	It was found on the high-end version of the automatic parking assist sensor system on the left side of the car (V1.05)

Fox radar distance display mode (G means green, Y means yellow, R means red) V1.06

part	Numeric range	part	Numeric range	part	Numeric range
G1 (farthest)	0x1F--0x1A G3 (far away) 0x13--0x0E Y (very close)				0x07--0x02
G2 (far away)	0x19--0x14	G4 (near)	0x0D--0x08 R (very close)		0x01

Note: 1. The rear left and rear right only have Y/R 2 segments;

2. There are 6 segments G1-G4/Y/R in the middle left middle and middle right back;

3. There are only Y/R 2 segments on the front left and right sides (the two newly added radar data on the edge);

4. There are only Y/R 2 segments on the front left and front right;

5. There are 3 sections G4/Y/R in the front left center and front right center;

6. As shown in Figure 3.

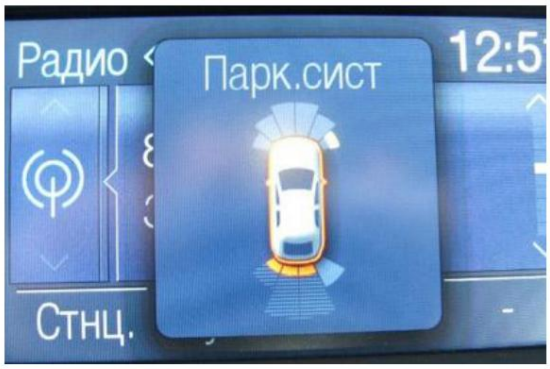


Figure 3: Radar distance display in reversing state

2.1.6. Basic information [0x24] (decoding end -> host end) (actively sent when data changes)

Data order	Data content	Remark
Data Type	0x24	type of data
Length	0x05 V1.28.000	Data length
Data0	Door information V1.04	Bit x==1 Door open Bit x==0 Door closed Bit7 right front door Bit6 left front door Bit5 Right rear door V1.20.000 F150 does not have this data Bit4 Left rear door V1.20.000 F150 does not have this data Bit3 rear door (trunk) V1.20.000 F150 does not have this data Bit2 front head cover (FUSION) V1.35.000
Data1	status information	Bit0: reverse status 1: Reverse 0: Not reverse Bit1: Key ON status V1.23.000 1:ON 0: Not ON (OFF/OUT/ACC/STARTING, etc.) (The manual air conditioning control panel will not be available in the non-ON state!) Bit 2: Lighting information (V1.21.000) (will delay 3-8 seconds before changing)

		1:ON 0: OFF Bit3: Handbrake status 0: Release the handbrake 1: Pull up the handbrake Bit5: Passenger airbag status V1.20.000 (exclusive for F150 2013) 0: off 1: open Bit6:My Key Volume Limit V1.19.000 0: No limit 1: Limit the maximum volume to half Bit7:My Key MUTE status V1.19.000 0: No MUTE 1: MUTE (not wearing a seat belt)
Data2		(reserved)
Data3		(reserved)
Data4		(reserved)

2.1.7. Parking assist status [0x25] (decoder side -> host side)

Data order	Data content	Remark
Data Type	0X25	type of data
Length	0x02	Data length
Data0	Park assist system status	Bit0 reserved Bit1 reserved Bit2 front radar working status 0b==off 1b==on Bit3 rear radar working status 0b==off 1b==on
Data1	reserve	

2.1.8 EPS (steering wheel angle) [0x26] V1.38.000

Data order	Data content	Remark
Data Type	0x26	Data type (this data packet is only sent when the DVD host queries deliver! !)
Length	0x02	Data length
Data0	EPS1	Steering wheel angle 1 (lower 8 bits of S16)
Data1	EPS2	Steering wheel angle 2 (upper 8 bits of S16)

Note: Two's complement representation, the range is plus or minus 0X2710, **this data packet is only** sent when the DVD **host queries! !**

(S16)EPS= =0 center

(S16)EPS>0 turn left

(S16)EPS<0 turn right

2.1.9 version information [0x30] (decoder side -> host side)

Data order	Data content	Remark
Data Type	0x30	type of data
Length	0x10	Data length
Data0—Data15	Version Information	ASCII code

2.1.10, SYNC SRT UP [0x70] (display characters - previous line) (decoding end -> host end) US version only (V1.10)

Data order	Data content	Remark
Data Type	0x70	type of data
Length	0x14	Data length
Data0—Data19	String information	ASCII code

2.1.11, SYNC SRT DOWN [0x71] (display characters - next line) (decoding end -> host end) US version only (V1.10)

Data order	Data content	Remark
Data Type	0x71	type of data
Length	0x14	Data length
Data0—Data19	String information	ASCII code

2.1.12, SYNC STR SHORT [0x72] (display characters - call time/USB track playback time) (decoding end -> host end) US version only (V1.10)

Data order	Data content	Remark
Data Type	0x72	type of data
Length	0x05	Data length
Data0—Data4	String information	ASCII code

2.1.13, SYNC status [0x78] (decoder side -> host side) V1.02

Data order	Data content	Remark
Data Type	0x78	type of data
Length	0x05	Data length
Data0	SYNC current working mode	0x00 OFF 0x01 ON (OTHERS original car is set to 1 in RADIO/CD, etc. status) 0x02 MEDIA 0x03 PHONE (dial/incoming call/during conversation V1.15.000) (When this value is greater than or equal to 1, it means that the SYNC command can be accepted)
Data1	SYNC module working status	Bit0 sync device exists bit 0 without sync module 1 with sync module Bit 1 Bluetooth device connection bit 0 not connected 1 connected

		Bit 3 SMS display bit 0 does not display 1 displays the SMS icon b4 sync voice status bit 0 non-voice state 1 voice state Bit 5 Telephone call status bit 0 Not in call status 1 In call status Bit 6 INFO soft key status under SYNC MEDIA menu 0 Not available 1 Available Only for US version (V1.10)
Data2	Mobile phone status	Bit 0-- Bit 3 mobile phone signal status 0-4, a total of 5 levels. Signal status >4 is invalid data and no signal is displayed. When it is 0, only the signal scale is displayed; when it is 1, the 1-bar signal is displayed, and so on. Bit 4-- Bit 7 mobile phone battery status 0-4 Total 5 levels of battery status > 4 is invalid data and does not display battery status When it is 0, it only displays a dead battery, when it is 1, it displays 1 battery, and so on.
Data3	reserve	
Data4	reserve	

2.1.14, AUDIO switching request [0x79] (decoder side -> host side) V1.02

Data order	Data content	Remark
Data Type	0x79	type of data
Length	0x01	Data length
Data0		0x00 requests to switch to 0FF (reserved, not used yet) 0x01 Request to switch to PHONE (there is an incoming call) 0x02 Request switching to exit PHONE (hang up) 0x03 Request to switch to MEDIA V1.16 0x04 Request to switch to SPEECH V1.14 0x05 Request to exit SPEECH V1.14

Note: When the DVD/GPS host receives this sound switching request data, it needs to mute the sound first, then notify the decoder READY, the decoder will switch, and then

After the DVD determines the SYNC status (0X78), if the switch is successful, it will appropriately delay about 1 second to release the mute. It can also be released if the switch is unsuccessful (more than 3 seconds).

2.1.15 Body language setting information [0x27] (decoder->host) V1.05

Data order	Data content	Remark
Data Type	0x27	type of data
Length	0x02	Data length
Data0	language type	0x02:English 0x03:American English 0x04:German 0x05:Italy

		0x06:France 0x07: French (US version) V1.18.003 0x08:Spain 0x09: Spanish (US version) V1.18.003 0x0A:Türkiye 0x0B:Russia 0x0C: Netherlands 0x0E:Poland 0x12:Sweden 0x16:Portugal 0x1b:Simplified Chinese V1.06 Other values are for unknown languages V1.05
Data1	reserve	

2.1.16, SYNC version information [0x40] (decoder->host) V1.10

Data order	Data content	Remark
Data Type	0x40	type of data
Length	0x01	Data length
Data0	Current SYNC system version	typedef enum { SYNC_VERSION_NONE,//No SYNC SYNC_VERSION_V1,//US version SYNC_VERSION_V2,//European version SYNC_VERSION_V3,//China }SYNC_VERSION;

2.1.17, SYNC V3 menu information [0x50] (decoder side -> host side) V1.10

Data order	Data content	Remark
Data Type	0x50	type of data
Length	0x08	Data length
Data0	Current menu type	SYNC_MENU_TYPE
Data1	The currently selected item in the menu	This item represents a certain line of text and icon in the menu (valid values 1-5, 0 means shown as unselected)
Data2	Menu item display percentage	==DEC1---DEC100 represents the percentage ==DEC 0 or other values are not displayed.
Data3	Current dialog type SYNC_MESSAGE_TYPE	
Data4	Selected item in current dialog box	This item represents a certain line of text and icon in the dialog box (valid values 1-5, 0 means not selected)

Data5	For the current menu large icon, see SYNC_MENU_ICON V1.11.000	
Data6	Menu percentage display bar properties	See SYNC_PERCENT_BAR_ATT V1.12.000 (It doesn't matter whether you do this or not)
Data7	reserve	

Note: Different menus/dialog boxes have different display styles. Please refer to the attached documents we provide.

```
typedef enum
{
    SYNC_MENU_ICON_NONE,
    SYNC_MENU_ICON_PHONE=2,
    SYNC_MENU_ICON_USB=0X0A,
    SYNC_MENU_ICON_A2DP=0X08,
    SYNC_MENU_ICON_LINE_IN=0X05,
    SYNC_MENU_ICON_IPOD=0X0C,
}SYNC_MENU_ICON; //Incomplete, to be updated! V1.12.000
typedef enum
{
    PERCENT_BAR_ATT_NONE,
    PERCENT_BAR_ATT_UP_DOWN=5, //Display that you can operate up and down (the direction icon is lit)
    PERCENT_BAR_ATT_UP=6,//The upward direction icon is lit
    PERCENT_BAR_ATT_DOWN=9, //The downward direction icon is lit
//Other values are invalid. If you encounter other values, you can consider displaying the progress bar and the direction (it doesn't matter whether you do this or not)
}PERCENT_BAR_ATT;//V1.12.000
typedef enum
{
    SYNC_MENU_TYPE_NONE=0X00, //Invalid (this value does not need to display the menu)
    SYNC_MENU_TYPE_BROWSER=0X02,//USB browsing/call history
    SYNC_MENU_TYPE_SRC,//Current source
    SYNC_MENU_TYPE_SETTING_MENU,//General setting menu
    SYNC_MENU_TYPE_PHONE_BOOK,//Phone book
    SYNC_MENU_TYPE_SPEED_DIAL,//speed dial
    SYNC_MENU_TYPE_TALKING,//On call
}SYNC_MENU_TYPE;
typedef enum
{
    SYNC_MESSAGE_TYPE_NONE=0, //Invalid (this value does not need to be displayed when the dialog box is not required)
    SYNC_MESSAGE_TYPE_1_LINE_NO_BUTTON=0x01,//1 line of text has no buttons
    SYNC_MESSAGE_TYPE_1_LINE_4_BUTTON, //1 line of text + the following 4 SOFT KEY
    SYNC_MESSAGE_TYPE_2_LINE_NO_BUTTON,//....
    SYNC_MESSAGE_TYPE_2_LINE_4_BUTTON, //....
    SYNC_MESSAGE_TYPE_3_LINE_NO_BUTTON, //....
    SYNC_MESSAGE_TYPE_3_LINE_4_BUTTON,//....
    SYNC_MESSAGE_TYPE_DIAL_REDIAL, //Dial/Redial/Incoming Call V1.14.001
    SYNC_MESSAGE_TYPE_SPEECH, //SYNC Voice
  SYNC_MESSAGE_TYPE_DIAL_A_NUMBER=0X0B, //Dial a phone number V1.14.001
}SYNC_MESSAGE_TYPE;
```

2.1.18, SYNC V3 menu item information [0x51] (decoder side -> host side) V1.10

Data order	Data content	Remark
Data Type	0x51	type of data
Length	0xXX	Data length (dynamic length, maximum DEC 52)
Data0	Line number	1-5 represents normal menu text lines (from top to bottom) 6-10 represents the text line of the dialog box 11-14 Strings/ICONs representing the 4 SOFT KEYs in the normal menu (from left to right) 15-18 Strings/ICONs representing the four SOFT KEYs in the dialog box (from left to right) (Parameter value is DEC v1.14)
Data1	Current row properties	b0-b3 If Data0 is text see SYNC_LINE_TEXT_ATT enumeration If Data0 is SOFT KEY, see SOFT_KEY_STATE enumeration b4 ==0 This row cannot be selected ==1 This row can be selected V1.16
Data2	ICON to the left of menu/dialog text or SOFT KEY ICON	For details, please see the SYNC V3 ICON list attachment.
Data3	ICON to the right of menu/dialog text Invalid when using SOFT KEY	For details, please see the SYNC V3 ICON list attachment.
Data4	UNICODE character 1L	UNICODE The lower 8 bits of the first character of the string
Data5	UNICODE character 1H	UNICODE The high 8 bits of the first character of the string
Data...		
Data50	UNICODE character 24L	UNICODE The lower 8 bits of the last character of the string
Data51	UNICODE character 24H	UNICODE The high 8 bits of the last character of the string

```
typedef enum
{
    SYNC_LINE_TEXT_ATT_NOR_TEXT,//Normal highlighted text/transparent background
    SYNC_LINE_TEXT_ATT_NOR_TEXT_GRAY_BKG,//Normal highlighted text/gray background
    SYNC_LINE_TEXT_ATT_GRAY_TEXT,//Gray text/transparent background
    SYNC_LINE_TEXT_ATT_GRAY_TEXT_GRAY_BKG,//Gray text/dark gray background
    SYNC_LINE_TEXT_ATT_DEEP_GRAY_TEXT,//Dark gray text/transparent background
    SYNC_LINE_TEXT_ATT_HIDDEN,//Line not displayed
}SYNC_LINE_TEXT_ATT;
typedef enum
{
    SOFT_KEY_STATE_NONE=0x00,//Unknown status
    SOFT_KEY_STATE_ICON=0x02,//Display icon
    SOFT_KEY_STATE_HIGHLIGHT_ICON=0x03, //Display the selected (gray background) icon
    SOFT_KEY_STATE_TEXT=0x0a, //Display text
    SOFT_KEY_STATE_HIGHTLIGHT_TEXT=0x0b, //Display the selected (gray background) text
}SOFT_KEY_STATE;
```

Gray fonts are reserved functions

2.1.18.1 SYNC command 1 (decoder side—>host side)

Data sequence Data content		Remark
DataType	0x7E	type of data
Length	0x02	Data length
Data0	Source	0X00: OFF 0x01: Tuner 0x02: DISC(DVD)
Data1	parameter	Data0==0x01 (Tuner) 0x01: AM1 0X02: AM2 0X11: FM1 0X12: FM2

2.1.18.2 SYNC command 2 (decoder side—>host side)

Data sequence Data content		Remark
DataType	0x7F	type of data
Length	0x02	Data length
Data0	Command	See Appendix 1
Data1	parameter 1	See Appendix 1
Data2	Parameter 2	See Appendix 1
Data3	Parameter 3	See Appendix 1
Data4	Parameter 4	See Appendix 1

Schedule 1:

Command parameter 1 0x01 (RADIO frequency)		Parameter 2 Parameter 3 Frequency		Parameter 4
Frequency LSB 0x02 (RADIO control) Preset radio		MSB Reserved Reserved Reserved		reserve
station:	0X01~0X0A			reserve
0X11(CD control 1)	0X00: Play 0X01: Pause 0X02: Previous song 0X03: The next song 0x04: Random track 0x05: Random folder 0x06: Repeat track 0x07: Duplicate folder	reserve	reserve	reserve
0X12 (CD control 2) Play the Nth song:	N: 0X01~0XFF	reserve	reserve	reserve

Note: RADIO frequency: FM: Freq= X/100(MHZ) AM: Freq= X (KHZ)

2.18.3. Sourceÿ0xC0ÿ(Host side -> Decoding side)

Data sequence data content remarks		
Data Type	0xC0	type of data
Length	0x02	Data length
Data0	Source Note 5: The gray source is temporarily not open and will be displayed if data is sent.	AUX EXT. 0x00: OFF 0x01: Tuner 0x02: Disc (CD,DVD) 0x03: TV(Analog) 0x04:NAVI 0x05:Phone 0x06:iPod 0x07: Aux 0x08: USB 0x09:SD 0x0A:DVB-T 0x0b:Phone A2DP V1.04 0x0c:Other 0x0D:CDC
Data1	Media type	0x01: Tuner 0x10: Simple Audio Media 0x11: Enhanced Audio Media 0x12: iPod 0x13: USB Audio Media 0x20: File based Video 0x21: DVD Video 0x22: Other Video 0x30: Aux,other 0x40: Phone

2.18.4. Radio information [0xC2] (host side -> decoding

side) Data sequence data		
content Data	0xC2	Remarks
Type	0x04	data type
Length Data0	radio band	data length 0x01: FM1 0x02: FM2 0x10: AM1 0x11: AM2
Data1	Current frequency value (Lsb) FM: Freq=X/100(Mhz)	AM: Freq=X (Khz)

Data2	Current frequency value (Msb)	
Data3	Preset radio number	0~10, 0 means the current radio station is not a preset radio station

2.18.5. CD status information [0xCD] (host side -> decoding side)

Data sequence	Data content	
DataType 0x65	Length	Remarks data type (Zone, function
	0x04	byte) Data
Data0	CD disc status	length 0x01: no disk 0X02: Eject the disc 0X03: Remove the disc 0X04: Loading disc 0X05: Disc reading normal 0X06: Failed to read disc
Data1	CD play status	0x00: Normal playback 0x01: Fast forward 0x02: Fast rewind 0x03: Pause 0x04: Stop 0x05: Waiting for disc
Data2	CD play mode	reading 0x00: Normal play mode 0x01: Repeat folder 0x02: Repeat track 0x03: Random folder 0X04: Random track 0X05: Browse folders 0X06: Browse tracks
Data3	Soft keys	Bit1~0: 00: None 01: Repeat (soft key 1) Bit3~2: 00: None 01: Random (soft key 2) Bit5~4: 00: None 01: Browse (soft key 3) Bit7~6: 00: None 01: Information (soft key 4)

2.1.19, SYNC V3 current MEDIA track playback time information [0x52] (decoder->host) V1.10

Data order	Data content	Remark
Data Type	0x52	type of data
Length	0x03	Data length
Data0	Hours V1.13	
Data1	minute	
Data2	Second	

Note: The maximum display time is 9:59:59 seconds

2.1.20, SYNC V3 current phone call time information [0x53] (decoding end->host end) V1.10

Data order	Data content	Remark
Data Type	0x53	type of data
Length	0x03	Data length
Data0	reserve	
Data1	minute	
Data2	Second	

2.2. Host side -> decoding side

2.2.1, Start/Endÿ0x81ÿ(Host side->Decoding side)

Data order	Data content	Remark
Data Type	0x81	type of data
Length	0x01	Data length
Data0	Command type	0x01: Start (HOST sends this command to establish a connection when the system starts. When HOST receives the response from SLAVE, it indicates that the connection is established successfully and communication can be carried out. letter) 0x00: End (HOST sends this command to disconnect when the system is shut down, HOST Receiving a response from SLAVE indicates that the disconnection is successful and the Host will no longer communicate with Slave communication)

2.2.2. Request controller information [0x90] (host side -> decoding side) V1.02

Data order	Data content	Remark
Data Type	0x90	type of data
Length	0x02	Data length
Data0	Request content	Can request all decoding box status 0x14---0x78 (Except AUDIO switching request [0x79]) 0xFF is to query all available data content V1.15
Data1		See parameter table V1.16.000

Parameter request controller information parameter table V1.16

Request content	parameter	Remark
0X51	Line number DATA0 corresponding to menu item information (0x51)	If this value is 0xFF, it indicates that the current foreground is requested Menu (menu currently displayed in the foreground)
other values	invalid	

2.2.3. Control command [0xC6] (host side -> decoding side)

Data order	Data content	Remark
Data Type	0xC6	type of data
Length	0x02	Data length
Data0	instruction	See Schedule to Directive
Data1	parameter	See Schedule to Directive

Schedule to the Directive

serial number	instruction	parameter	Remark
1	0xA0 (Temperature display unit)	0x00 degrees Celsius 0x01 Fahrenheit	This command is used to set the display of the trip computer. Display unit, our company decodes and outputs body temperature Values are still in degrees Celsius, please Users can switch by themselves. (The Chinese version does not need to be V1.10)
2	0xA1 SYNC command	See SYNC instruction schedule V1.01	
3	0xA4 language setting V1.27.000	Refer to body language setting information [0x27] DATA0 in	
4	0xAC air conditioning button V1.23.000	0x00 no button 0x01 Air conditioning switch key 0x02 AC key 0x03 inner loop key 0x04 MAXAC 0x05 Front window defogging 0x06 Rearview mirror defogger 0x07 wind direction button 0x11 Rear seat air conditioning switch key 0x12 Rear seat air conditioning control key 0x13 Rear seat temperature reduction button 0x14 Rear seat temperature plus button 0x15 Rear seat wind speed reduction button 0x16 Rear seat wind speed increase button 0x17 AUTO key V1.31 dedicated for automatic air conditioning 0x18 DUAL key V1.31 dedicated for automatic air conditioning	Every time the decoding board receives an instruction, it will Calculates based on the current state and returns The corresponding status is given to the DVD/button panel.

		0x19 MY TEMP LOAD (key short press) V1.34 **automatic empty** Dedicated for tuning 0x1A MY TEMP SAVE (key long press) V1.34 **automatically empty** Dedicated for tuning	
5	0xAD **air conditioner wind speed** **V1.23.000**	0x01 ~ 0x07 **wind speed**	**Note: The wind speed knob cannot be turned off** **The blower is closed, so the control range can only be** **1~7, but the range of status return value will be** 0~7.
6	0xAE Air conditioning cooling/heating level **V1.23.000**	DEC 0~30	For details, see the air-conditioning information data package (manual empty **(Tune) description** **If the decoder receives this packet, it will** **Switch the working mode to manual air conditioning mode.** **And stored in** EEPROM V1.31
7	**0xAA**	**Automatic air conditioning left side set temperature** V1.31	Val>=0x1e **and** Val<=0x3C **are degrees Celsius** **Degree** 0x1E==LO 0x3C==HI 0x1F==15.5C~~~ 0x3B==29.5C Val>=0x77 **and** Val<=0xAB **are Huawei** **Degree** 0x77==LO 0xAB==HI 0x78==60F~~~ 0xAA==85F **(even** **The numerical value is valid and there** are 26 levels in total) V1.32 **If the decoder receives this packet, it will** **Switch the working mode to automatic air conditioning mode.** **And stored in** EEPROM V1.31
8	**0xAB**	**Automatic air conditioning right side set temperature** V1.31	Same as above
9	**0xA9**	**Seat heating** V1.32	Bit0~Bit1 **left seat heating** 0==Close1 == **Level** 1 2== **Level** 2 Bit2~Bit3 **right seat heating** 0==Close1 == **Level** 1 2== **Level** 2

SYNC instruction schedule V1.01

instruction	effect	Applicable status				
		SPEECH	MEDIA	PHONE	OTHERS	USA/CH
0x01 SPEECH	SYNC voice button	ÿ Note 1 ÿ	ÿ ÿ	US-China		
0x02 MENU	to enter the SYNC menu Note 9 V1.18.001		ÿ ÿ			America and China
0x03 PHONE	switches to PHONE (menu V1.15.000) to	ÿ ÿ			ÿ	US-China
0x04END	hang up the phone (or exit the phone menu) Note 2			ÿ		America and China
0x05 SEND	dial number Note 2			ÿ		America and China
0x06 INFO	Display SYNC MEDIA INFO information (Note 3)		ÿ			America and China
0x07 SHUFF	SYNC MEDIA random play button (Note 3)		ÿ			beautiful
0x08 PREV	SYNC MEDIA Previous song		ÿ			America and China

0x09 NEXT	SYNC MEDIA next song		ÿ			America and China
0x0A UP	SYNC up button (Note 4)		ÿ ÿ ÿ US-China			
0x0BDOWN	SYNC down button		ÿ ÿ ÿ US-China			
0x0C OK	SYNC OK button (Note 6)		ÿ ÿ ÿ US-China			
0x0D NUM_0	SYNC phone button 0			ÿ		America and China
0x0E NUM_1	SYNC phone button 1			ÿ		America and China
0x0F NUM_2	SYNC phone button 2			ÿ		America and China
0x10 NUM_3	SYNC phone button 3			ÿ		America and China
0x11 NUM_4	SYNC phone button 4			ÿ		America and China
0x12 NUM_5	SYNC phone button 5			ÿ		America and China
0x13 NUM_6	SYNC phone button 6			ÿ		America and China
0x14 NUM_7	SYNC phone button 7			ÿ		America and China
0x15 NUM_8	SYNC phone button 8			ÿ		America and China
0x16 NUM_9	SYNC phone button 9			ÿ		America and China
0x17 *	SYNC phone button*			ÿ		America and China
0x18 #	SYNC phone button#			ÿ		America and China
0x19 LEFT	SYNC left button V1.13		ÿ ÿ			middle
0x1A RIGHT	SYNC right button		ÿ ÿ			middle
0x1B AUX	V1.13 SYNC AUX button V1.13 For SYNC MEDIA switching	ÿ ÿ ÿ ÿ Medium				
0x1C S1	SYNC SOFT KEY 1 (far left) V1.13		ÿ ÿ			middle
0x1D S2	SYNC SOFT KEY 2 (far left) V1.13		ÿ ÿ			middle
0x1E S3	SYNC SOFT KEY 3 (far left) V1.13		ÿ ÿ			middle
0x1F S4	SYNC SOFT KEY 4 (far left) V1.13		ÿ ÿ			middle
0x20 APP	SYNC APPLICATIONS V1.18 (Currently, domestic models are not equipped with SYNC. application, just reserved for future use)		ÿ ÿ			middle
0x81 2_MEDIA	Note 9 Switch to SYNC MEDIA (V1.10 for US version only) ÿ			ÿ ÿ US-China		
0x82 2_OTHERS	Exit from SYNC Voice/PHONE/MEDIA Note 5 ÿ ÿ ÿ					America and China
0x83 READY	This command is sent when the host is ready to switch audio (Note 7)	ÿ ÿ ÿ ÿ US-China				
0x84	Exit the current SYNC menu command V1.17					middle
0x91	Select menu row 1 Note 8					middle
0x92	V1.16 Select menu row 2 Note					middle
0x93	8 V1.16 Select menu row 3					middle
0x94	Note 8 V1.16 Select menu row					middle
0x95	4 Note 8 V1.16 Select menu row 5 Note 8 V1.16					middle
0xA0	reserve					

Status explanation:

SPEECH SYNC voice status

USB/BLUETOOTH AUDIO/LINE IN for MEDIA SYNC module

PHONE The phone status of the SYNC module (the Chinese version only outputs the PHONE status V1.16 when dialing/talking/incoming calls)

OTHERS Status other than the above status (corresponding to the RADIO/CD/shutdown status of the original car)

illustrate

1. This command is used in conjunction with "2.1.13 AUDIO switching request [0x79]"

2. ITEM selection instructions: For the convenience of customers, a menu item is added to be selected directly through instructions (the dialog box does not support it), provided that the row can be selected. Be in charge

When the machine sends this command, we will select the corresponding item and send the OK command. However, special attention should be paid to the fact that although the original car menu data for some items refers to

It indicates that the behavior is optional, but it is not actually optional, such as the items in SYNC_MENU_TYPE_SRC. Therefore, it is recommended that customers only

Used when SYNC_MENU_TYPE_SRC state. V1.16 3. The MENU/APP

button is recommended to be called only in the SYNC MEDIA state.

Chinese version description

1. The decoder is responsible for sending the current menu content of the SYNC module and the selected items in the menu to the DVD. The DVD is responsible for displaying and can operate the upper menu on the DVD.

/Down/Left/Right/OK key/4 SOFT KEY to operate the menu.

2. Ordinary menus and dialog boxes can coexist at the same time, and the dialog box can be understood as a pop-up window (MESSAGE_BOX). When exiting the dialog box, the current

of the normal menu.

3. Since the original car DISPLAY can display a large number of icons, the artist has a certain workload

4. The function of SOFT KEY can be changed at any time, and the specific function depends on the display content on the SOFT KEY button in the current menu.

5. If all enumerations in this article receive a value that is not in the enumeration list during actual processing, the value can be regarded as NONE or an illegal value V1.13.001. 6. Since the radar of

domestic models will continue to operate after reversing for the first time. Open, it will not automatically stop sending until the vehicle speed exceeds 15KM/H, so the customer is doing

When using the radar interface, it is necessary to determine whether the vehicle is in reversing state. The front radar can directly determine whether the open flag is 1. If it is 1, the radar distance needs to be displayed.

V1.18.002

7. When the client host is working in OTHERS (CD/RADIO/GPS/DVD, etc.) state, if the received MENU_TYPE or MESSAGE_TYPE is not 0,

It means that the SYNC menu needs to be displayed. V1.15 8.

After receiving the 0x51 menu item information, the customer will receive the 0X50 menu information. It would be ideal to SHOW the menu at this time. V1.15 9. During a phone call, the MEDIA/

AUX/OTHERS command cannot be executed to switch sources!

10. When the original car sends the menu, although some menu items are set as optional, they cannot actually be selected and confirmed by pressing the OK button. For example MEDIA

INFO menu during playback.

US version description

1. After entering the SPEECH voice prompt state, pressing the SYNC voice button will enter the LISTENING state.

2. The SEND/END buttons are the two soft keys under the original car phone menu. When there is an incoming call, SEND means answering, END means rejecting the call. In the dialing state, SEND means dialing.

Out, END means cancel the current input. V1.02

3. The SHUFF/INFO keys are two soft keys under the SYNC MEDIA menu of the original car. Whether the INFO key has any effect depends on the INFO under the SYNC MEDIA menu.

See Figure 1 for the soft key status. (Note that the original car also has an INFO physical button)

4. In the dialing state (if the number has been entered), the UP button is equal to the delete button.

5. When receiving that the SYNC operating mode is OFF, this command can be sent to make the system enter the OTHERS (ON) state.

6. The original OK button functions as PLAY/PAUSE during SYNC MEDIA playback. (Customers only need to know, no special treatment is required)

All SYNC menu operations interact with the user through the 3-line SYNC string. "SYNC STR SHORTÿ0x72ÿ" displays the call time in the phone status.

Display track playback time in USB status;

3. Debugging points (common to all versions)

3.1. When connecting the DVD/GPS host to the decoder, remember to connect a pull-up resistor to the TXD/RXD port, otherwise debugging will not be possible;

3.2. Since some models have front-vehicle radar, and vehicles with this function can also enter the radar interface when not reversing, it is judged to display radar information.

The premise should not depend on the reverse status. Instead, it should be displayed when radar information is received, and the next radar data cannot be received after more than 500ms.

package, exit the radar display interface. (The decoder software is now set to normal communication status. If there is radar information, it will be retransmitted every 200MS or so.

radar information);

3.3. Regardless of whether the decoder is currently in the "connection established successfully" state, it will send relevant data packets to the host according to the status of the body data;

3.4. Under various conditions, the SYNC system may receive an incoming call at any time, and audio-related switching is required when there is an incoming call;

3.5. The customer host needs to add a "SYNC MEDIA button" to the UI to switch to the "SYNC MEDIA interface" to display the original SYNC MEDIA menu and SYNC MEDIA Status and add button operation SYNC module;

3.6. The customer host must consider the display method of icons such as the original car's Bluetooth connection or not connected icons, the outside temperature of the car, the phone's battery level after the original car's Bluetooth, and the signal strength. (Except for the Bluetooth icon and outside temperature, other SYNC-related icons are only displayed on the SYNC MEDIA interface). Refer to the original car display in Figure 1 and Figure 2 in non-SYNC The display of MEDIA status is the same as POWER OFF;

3.7. When the client host receives the [AUDIO switching request] packet, it needs to mute the sound first, and then send the "READY" command (see control command->SYNC command) to notify the decoder that it is ready, the decoder will switch, and then the client host will judge whether the SYNC status (0X78) switch is successful (the check is Whether it has entered/exited the PHONE/SPEECH (V1.14) state). If the switch is successful, the mute will be released after an appropriate delay of a few hundred milliseconds (if the delay is too long, it will be lost) Some sound prompts) V1.16, if the switch is unsuccessful (more than 3 seconds), the mute can also be released.

3.8. Body time. The car body has a clock oscillation, and it will run automatically if the initial time is given. The time needs to be set through the host. The purpose of this time on the car body is unknown, but the original car host sends this data when adjusting the clock. And some models cannot set the year, month and day, only Hours/minutes can be set, and values can still be sent, but the returned value is always a fixed date. V1.06 3.9. The host can query all data packets except 0X79 sent by the decoding box.

3.10. The rear radar of some models (domestic) will always be on after being started and cannot be turned off. Therefore, the radar interface of such models cannot determine the radar. Whether to drive to display the radar interface, but to determine whether it is in reversing state. V1.06 3.11, the domestic Ruijie high-end rear seat air conditioner only has 4 options on the audio host screen: rear air conditioner lock status, air conditioner switch status, temperature adjustment, and air volume. Among them, only the lock status of the rear seat air conditioner and the status of the air conditioner switch are displayed. The other temperature adjustment, air volume and other information do not have specific numerical values displayed. The host screen Screen can only blindly operate on relevant information. V1.38.000 version update instructions

V1.00.000 2012-02-01

V1.00.001 Re-formatted, corrected typos, and added explanations

V1.01.000 newly added SYNC status, SYNC key command

V1.03.000 adds clock information and setting data package

V1.04.000 adds door information

V1.05.000 adds body language information and modifies front radar information (adds two sets of high-end automatic parking radars)

V1.06.000 adds domestic car model language, modifies the radar display comparison table, and adds some instructions.

V1.06.001 corrects the front radar length error.

V1.10.000 adds Chinese version content

V1.11.000 adds large icons

V1.12.000 Added progress bar attribute items

V1.13.000 Modify the playback time and modify the ID of the new command

V1.13.001 Modify some descriptions

V1.14.000 adds switching SPEECH voice request command

V1.14.001 Fixed some comments

V1.14.002 Added rear radar description

V1.15.000 adds the command 0XFF that can query all available data.

Add some instructions

V1.16.000 adds the function of direct selection of menu items (customers can select directly through the touch screen)

Add query parameters

Modify some instructions

V1.17.000 adds the function of exiting the current SYNC menu

V1.18.000 Added SYNC APPLICATIONS menu key

V1.18.001 modified/added some comments

V1.18.002 Radar description before and after modification

V1.18.003 Added definitions for the US version of French/Spanish

V1.19.000 adds US version MY KEY status

V1.20.000 adds US version F150 passenger airbag status

Add automatic parking system status information

V1.21.000 Add light mark position

V1.22.000 adds the key value output of the original car LINBUS panel keys, including FOCUS 2012/ESCAPE

Add panel LED light control data

V1.23.000 adds 2013 F150, EDGE, and EXPLORER SUV models with manual air conditioning information and controls for mid- and low-end configurations

Add key status in basic information

V1.24.000 Add vehicle setting status/command to Yibo (reserved)

V1.25.000 Add body information warning prompt for Yibo (reserved)

V1.26.000 adds 1. Warning sound control to Yibo (if the customer needs to realize that when more than one warning message appears at the same time, different warning messages will be displayed. When different warning sounds are emitted simultaneously, you need to decide which warning sound is currently issued) 2. Mileage unit setting (this setting has no impact on the car body) Unknown, can affect the carnival's driving computer display) (reserved)

V1.27.000 adds language settings for the Chinese version of Yibo (reserved)

V1.28.000 adds brightness setting items for 2013 Fiesta, Ford fuel-saving mode related status (reserved)

V1.29.000 Modify XX% mileage engine not hot percentage (reserved)

V1.29.001 Correction of clerical errors (reserved)

V1.29.002 modified some description contents (reserved)

V1.30.000 adds a PHONE button for FORD SUV (F150 2013, etc.)

V1.31.000 adds control command/status output for SUV automatic air conditioning

V1.32.000 Modifies the key value of the PHONE key for SUV, corrects the clerical error of the automatic air conditioning setting temperature, and adds the seat heating control command/status output

V1.33.000 adds body warning information to Yibo low-end configuration, and increases the length by 8 bytes (reserved)

V1.33.001 Modify the text description in the warning message (reserved)

V1.34.000 adds a MY TEMP button (note: no status output) to the SUV automatic air conditioning controller. This button is used to memorize the left side temperature and restore it. to this temperature. Add steering wheel MUTE button to FUSION

V1.35.000 adds front cover information for FUSION

V1.36.000 Add vehicle speed information (0x16) (reserved)

V1.36.001 deletes the functions of Focus, Escape, Escape and Fiesta models based on V1.36.000.

V1.37.000 adds FUSION/MONDEO rear window defogging status output from the serial port

Added support for FUSION/MONDEO reversing radar data output from the serial port

V1.37.001 Compatible FUSION/MONDEO reversing radar data into the original SUV model standard and no longer interprets it independently

V1.38.000 adds steering wheel angle information output

Added domestic Ruijie original car audio panel key value output

Added domestic Ruijie high-end rear seat air conditioning switch status display

Added instructions on the rear seat air conditioning control and display of the domestic Ruijie high-end configuration in the debugging points.

V1.38.001 Compatible the domestic Ruijie high-end rear seat air conditioning control and display instructions into the original SUV model standards, and no longer solve them independently.